

CLAIMS

1. An optical film for a liquid crystal display obtained by laminating a polarizing plate and a retardation film so that an
 5 absorption axis of the polarizing plate and a slow axis of the retardation film are perpendicular or parallel to each other,

wherein the polarizing plate comprises a transparent protective film on both surfaces of a polarizer and if a direction on the transparent protective film in which an in-plane refractive
 10 index is maximized is X axis, a direction perpendicular to X axis is Y axis, a direction of the film thickness is Z axis; and refractive indexes at 550 nm in the respective axes directions are nx_1 , ny_1 and nz_1 ; and a thickness of the film is d_1 (nm) by definition,

15 an in-plane retardation $Re_1 = (nx_1 - ny_1) \times d_1$ is 10 nm or less and

a thickness direction retardation $R_{th} = \{(nx_1 + ny_1)/2 - nz_1\} \times d_1$ is in the range of from 30 nm to 100 nm, and

wherein if a direction on the retardation film in which an
 20 in-plane refractive index is maximized is X axis, a direction perpendicular to X axis is Y axis, a direction perpendicular to X axis is Y axis, a direction of the film thickness is Z axis; and refractive indexes at 550 nm in the respective axes directions are nx_2 , ny_2 and nz_2 ; and a thickness of the film is d_2 (nm) by
 25 definition, the following relations are satisfied:

an N_z value represented by $N_z = (n_{x2} - n_{z2}) / (n_{x2} - n_{y2})$ is in the range of from 0.1 to 0.8 and

an in-plane retardation $Re_2 = (n_{x2} - n_{y2}) \times d_2$ is in the range of from 60 to 300 nm.

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2. The optical film according to claim 1, applied to an IPS mode liquid crystal display comprising a liquid crystal cell driven in IPS mode.

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3. The optical film according to claim 2, wherein the liquid crystal cell driven in IPS mode is a liquid crystal cell in IPS mode having a retardation value in the range of from 230 to 360 nm at 550 nm when no voltage is applied.

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4. A transmissive liquid crystal display comprising: a liquid crystal cell containing a pair of substrates between which a liquid crystal layer is sandwiched, and driven in IPS mode; and a pair of polarizing plates disposed on both sides of the liquid crystal cells so that an absorption axis of the polarizing plates are perpendicular to each other,

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wherein at least one of the polarizing plates is an optical film according to claim 2 or 3, and the optical film is disposed so that an retardation film sides face the liquid crystal cell.

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5. The transmissive liquid crystal display according to claim 4,

wherein the optical film according to claim 2 or 3 is disposed on a cell substrate on the viewing side, and

an extraordinary refractive index direction of a liquid crystal material in the liquid crystal cell when no voltage is applied and an absorption axis of the polarizing plate on the light incidence side are parallel to each other.

6. The transmissive liquid crystal display according to claim 4,

wherein the optical film according to claim 2 or 3 is disposed on a cell substrate on the light incidence side, and

an extraordinary index direction of a liquid crystal material in the liquid crystal cell when no voltage is applied and an absorption axis of the polarizing plate in the optical film are perpendicular to each other.

7. The transmissive liquid crystal display according to claim 5 or 6, wherein the optical film comprises a polarizing plate and a retardation film so that an absorption axis of the polarizing plate and a slow axis of the retardation film are perpendicular to each other.

8. The transmissive liquid crystal display according to claim 4,

wherein the optical film according to claim 2 or 3 are disposed on a cell substrate on the viewing side and the light incidence side, and

an extraordinary index direction of a liquid crystal material in the liquid crystal cell when no voltage is applied and an absorption axis of the polarizing plate in the optical film on the light incidence side are parallel to each other.

9. The transmissive liquid crystal display according to claim 8, wherein the optical film comprises a polarizing plate and a retardation film so that an absorption axis of the polarizing plate and a slow axis of the retardation film are parallel to each other.

10. The transmissive liquid crystal display according to claim 8 or 9, wherein an in-plane retardation Re_2 of the retardation film in the optical film disposed on the cell substrate on the light incidence side is smaller than an in-plane retardation Re_2 of the retardation film in the optical film disposed on the cell substrate on the viewing side.